SEQUENCE LISTING

<110> Joe Cohen
Yves Lobet
Guy Dequesne
Lauren Bakaletz

<120> Vaccine

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1 5 10

gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa 156
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atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat 204
Met Lys Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr
35 40 45

tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag 252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln
50 55 60

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65 70 75

gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa 348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys
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aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac 396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp
95 100 105 110

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Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu

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            130                 135                 140

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Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe
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atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca      588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro
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gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct      636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala
175                 180                 185                 190

gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc      684
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr
                195                 200                 205

gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc      732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile
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aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa      780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln
        225                 230                 235

tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag      828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys
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Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala
255                 260                 265                 270

atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat      924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr
                275                 280                 285

atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act      972
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            290                 295                 300

ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac     1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr
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Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln
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atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act     1116
Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr
335                 340                 345                 350

gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg     1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met
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        35                  40                  45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
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Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65                  70                  75                  80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
                85                  90                  95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
            100                 105                 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
        115                 120                 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
    130                 135                 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145                 150                 155                 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
                165                 170                 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
            180                 185                 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
        195                 200                 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
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Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225                 230                 235                 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
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Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
            260                 265                 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
        275                 280                 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
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Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305                 310                 315                 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
                325                 330                 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
            340                 345                 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Ala Thr
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Cys Asp Gln Ser Ser Thr Ser Gly His His His His His His
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       Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly
        1               5                  10

gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa       156
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln
 15                  20                  25                  30

atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat       204
Met Lys Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr
                 35                  40                  45

tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag       252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln
             50                  55                  60

gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta       300
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu
         65                  70                  75

gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa       348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys
     80                  85                  90

aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac       396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp
 95                  100                 105                 110

ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa       444
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu
                115                 120                 125

acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt       492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu
            130                 135                 140

tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt       540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe
        145                 150                 155

atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca       588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro
    160                 165                 170

gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct       636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala
175                 180                 185                 190

gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc       684
```

```
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr
                195                 200                 205

gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc      732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile
            210                 215                 220

aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa      780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln
        225                 230                 235

tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag      828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys
    240                 245                 250

ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca      876
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala
255                 260                 265                 270

atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat      924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr
                275                 280                 285

atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act      972
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr
            290                 295                 300

ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac     1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr
        305                 310                 315

acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa     1068
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln
    320                 325                 330

atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act     1116
Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr
335                 340                 345                 350

gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg     1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met
                355                 360                 365

gat ggt ggc aaa gca ggt gtt gct tta gta cgt tct gat tat aaa ttt     1212
Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Phe
            370                 375                 380

tat gaa gat gca aac ggt act cgt gac cac aag aaa ggt cgt cac aca     1260
Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys Lys Gly Arg His Thr
        385                 390                 395

gca cgt act agt ggc cac cat cac cat cac cat taatctagaa tcgataagct   1313
Ala Arg Thr Ser Gly His His His His His His
    400                 405

tcgaccgatg cc                                                      1325
```

<210> 77
<211> 409
<212> PRT
<213> Haemophilus influenzae - see Figure 3

<400> 77

```
Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
 1               5                  10                  15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
            20                  25                  30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
        35                  40                  45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
    50                  55                  60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65                  70                  75                  80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
                85                  90                  95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
            100                 105                 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
        115                 120                 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
    130                 135                 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145                 150                 155                 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
                165                 170                 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
            180                 185                 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
        195                 200                 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
    210                 215                 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225                 230                 235                 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
                245                 250                 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
            260                 265                 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
        275                 280                 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
    290                 295                 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305                 310                 315                 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
                325                 330                 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
            340                 345                 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
        355                 360                 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Phe Tyr Glu
    370                 375                 380
Asp Ala Asn Gly Thr Arg Asp His Lys Lys Gly Arg His Thr Ala Arg
385                 390                 395                 400
Thr Ser Gly His His His His His His
                405
```

<210> 78
<211> 1442
<212> DNA
<213> Haemophilus influenzae - see Figure 4

<220>

<221> CDS
<222> (67)...(1411)

<400> 78

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ctcttacaca ttccagccct gaaaaagggc atcaaattaa accacacctt aaggaggata      60
taacat atg gat cca aaa act tta gcc ctt tct tta tta gca gct ggc         108
       Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly
        1               5                  10

gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa       156
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln
 15                  20                  25                  30

atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat       204
Met Lys Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr
                 35                  40                  45

tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag       252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln
             50                  55                  60

gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta       300
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu
         65                  70                  75

gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa       348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys
     80                  85                  90

aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac       396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp
 95                  100                 105                 110

ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa       444
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu
                115                 120                 125

acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt       492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu
            130                 135                 140

tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt       540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe
        145                 150                 155

atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca       588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro
    160                 165                 170

gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct       636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala
175                 180                 185                 190

gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc       684
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr
                195                 200                 205

gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc       732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile
            210                 215                 220
```

```
aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa      780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln
        225                 230                 235

tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag      828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys
    240                 245                 250

ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca      876
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala
255                 260                 265                 270

atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat      924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr
                275                 280                 285

atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act      972
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr
            290                 295                 300

ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac     1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr
        305                 310                 315

acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa     1068
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln
    320                 325                 330

atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act     1116
Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr
335                 340                 345                 350

gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg     1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met
                355                 360                 365

gat ggc ggt aaa gca ggt gtt gct tta gtt cgt tct gac tat aaa ttg     1212
Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu
            370                 375                 380

tac aat aaa aat agt agt agt aat agt act ctt aaa aac cta ggc gaa     1260
Tyr Asn Lys Asn Ser Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu
        385                 390                 395

cat cac aga gca cgt gcc atg gat ggt ggc aaa gca ggt gtt gct tta     1308
His His Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu
    400                 405                 410

gta cgt tct gat tat aaa ttt tat gaa gat gca aac ggt act cgt gac     1356
Val Arg Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp
415                 420                 425                 430

cac aag aaa ggt cgt cac aca gca cgt act agt ggc cac cat cac cat     1404
His Lys Lys Gly Arg His Thr Ala Arg Thr Ser Gly His His His His
                435                 440                 445

cac cat t aatctagaat cgataagctt cgaccgatgc c                       1442
His His
```

<210> 79
<211> 448
<212> PRT
<213> Haemophilus influenzae - see Figure 4

<400> 79

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Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
 1               5                  10                  15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
            20                  25                  30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
        35                  40                  45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
    50                  55                  60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65                  70                  75                  80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
                85                  90                  95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
            100                 105                 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
        115                 120                 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
    130                 135                 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145                 150                 155                 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
                165                 170                 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
            180                 185                 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
        195                 200                 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
    210                 215                 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225                 230                 235                 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
                245                 250                 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
            260                 265                 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
        275                 280                 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
    290                 295                 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305                 310                 315                 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
                325                 330                 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
            340                 345                 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
        355                 360                 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu Tyr Asn
    370                 375                 380
Lys Asn Ser Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu His His
385                 390                 395                 400
Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg
                405                 410                 415
Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys
            420                 425                 430
Lys Gly Arg His Thr Ala Arg Thr Ser Gly His His His His His His
```

435 440 445

<210> 80
<211> 1490
<212> DNA
<213> Haemophilus influenzae - see Figure 5

<220>
<221> CDS
<222> (67)...(1458)

<400> 80

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ctcttacaca ttccagccct gaaaaagggc atcaaattaa accacacctt aaggaggata      60
taacat atg gat cca aaa act tta gcc ctt tct tta tta gca gct ggc         108
       Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly
        1               5                  10

gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa       156
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln
 15                  20                  25                  30

atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat       204
Met Lys Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr
                 35                  40                  45

tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag       252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln
             50                  55                  60

gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta       300
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu
         65                  70                  75

gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa       348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys
     80                  85                  90

aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac       396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp
 95                  100                 105                 110

ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa       444
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu
                115                 120                 125

acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt       492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu
            130                 135                 140

tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt       540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe
        145                 150                 155

atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca       588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro
    160                 165                 170

gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct       636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala
175                 180                 185                 190
```

```
gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc      684
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr
                195                 200                 205

gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc      732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile
            210                 215                 220

aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa      780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln
        225                 230                 235

tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag      828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys
    240                 245                 250

ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca      876
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala
255                 260                 265                 270

atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat      924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr
                275                 280                 285

atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act      972
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr
            290                 295                 300

ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac     1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr
        305                 310                 315

acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa     1068
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln
    320                 325                 330

atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act     1116
Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr
335                 340                 345                 350

gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg     1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met
                355                 360                 365

gat ggc ggt aaa gca ggt gtt gct tta gtt cgt tct gac tat aaa ttg     1212
Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu
            370                 375                 380

tac aat aaa aat agt agt agt aat agt act ctt aaa aac cta ggc gaa     1260
Tyr Asn Lys Asn Ser Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu
        385                 390                 395

cat cac aga gca cgt gcc atg gat ggt ggc aaa gca ggt gtt gct tta     1308
His His Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu
    400                 405                 410

gta cgt tct gat tat aaa ttt tat gaa gat gca aac ggt act cgt gac     1356
Val Arg Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp
415                 420                 425                 430

cac aag aaa ggt cgt cac aca gca cgt act agt cgt tct gac tat aaa     1404
```

```
His Lys Lys Gly Arg His Thr Ala Arg Thr Ser Arg Ser Asp Tyr Lys
                435                 440                 445

ttc tac gat aat aaa cgc atc gat agt act agt ggc cac cat cac cat      1452
Phe Tyr Asp Asn Lys Arg Ile Asp Ser Thr Ser Gly His His His His
            450                 455                 460

cac cat taatctagaa tcgataagct tcgaccgatg cc                         1490
His His
```

<210> 81
<211> 464
<212> PRT
<213> Haemophilus influenzae - see Figure 5

<400> 81

```
Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
 1               5                  10                  15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
            20                  25                  30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
        35                  40                  45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
    50                  55                  60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65                  70                  75                  80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
                85                  90                  95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
            100                 105                 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
        115                 120                 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
    130                 135                 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145                 150                 155                 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
                165                 170                 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
            180                 185                 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
        195                 200                 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
    210                 215                 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225                 230                 235                 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
                245                 250                 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
            260                 265                 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
        275                 280                 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
    290                 295                 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305                 310                 315                 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
                325                 330                 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
```

```
                340                 345                 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
            355                 360                 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu Tyr Asn
    370                 375                 380
Lys Asn Ser Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu His His
385                 390                 395                 400
Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg
                405                 410                 415
Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys
            420                 425                 430
Lys Gly Arg His Thr Ala Arg Thr Ser Arg Ser Asp Tyr Lys Phe Tyr
        435                 440                 445
Asp Asn Lys Arg Ile Asp Ser Thr Ser Gly His His His His His His
    450                 455                 460
```